49. (new) The gas purification method as recited in claim 11, further comprised of the step of thermally regenerating said hydrogen sponge by heating said hydrogen sponge to a temperature of approximately 200 degrees Celsius.

REMARKS

Examiner Greene is thanked for the thorough office action of October 3, 2001. Because many of the amended claims much better reflect the Applicant's invention, the rejection(s) is no longer relevant. Amended independent claims 21, 35 and 36 (and all subsequent dependent claims) better reflect a particular aspect of the invention, the temperature protection system, that was not fully claimed, but is fully supported by the specification at Pg. 15, line 1- Page 19, line 22. For reason stated below, we do not believe that claim 1 was properly rejected. Claim 1 is now the exact subject matter of new claim 48.

Claims 1-10 are no longer anticipated because the claims have been amended to include an element not included in the prior art, namely, the ability to thermally regenerate the hydrogen sponge without damage to the adsorption/filter unit. This is supported by the specification at page 24, lines 17-22.

Claims 11-20 are no longer anticipated by the cited art because an element has been added that teaches monitoring the hydrogen sponge temperature and sounding an alarm when an alarm temperature is exceeded. This is supported by page 24, lines 4-15 of the specification.

New claims 39-45 reflect temperature sensing and melt zone determination aspects of the invention for independent claim 21, and are fully supported by the specification, mainly on pages 17, line 25 to page 18 line 20.

New claim 46 is dependent upon amended independent claim 1.

New claims 47 and 49 are dependent upon amended independent claim 11.

Corrected drawings will be submitted forthwith upon allowance of claims.

102(a) rejections

The Examiner states that Snow (US Patent 5, 456,740) anticipates claims 1, 2, 4, 7, 8 and 9 under 102 (b). However, the amended claims reflect the applicant's invention better with the addition of the thermally regenerate-able hydrogen sponge/filter unit. However claim 48 has replaced independent claim 1.

Snow teaches a getter filtering device, and clearly the Applicant's comprehensive system including the sponge/filtering unit cannot have such a unit as taught in Snow because it could not function in the applicant's invention. We do not believe such a structure can anticipate claim 1 (or subsequent dependent claims) for the following reasons. Col. 2, lines 3-53 discuss both particular metal filers and hydrogen getters but do not discuss or teach flow, temperature or any other aspect of the claim 48 element c (or amended claim 1).

Furthermore, the background section of Snow discusses the drawbacks of the unidirectional flow in the use of multiple gettering and filtration units, thus not only fails to anticipate claims element which is a single unit unidirectional flow, but actually ***teaches away*** from the single compound unit of the Applicant's invention. Snow at col. 3, line 62-col. 4, line 35 also discusses a summary of the invention but teaches a combination of getter and sintered metal, which is not the subject of Applicants' claim 1. In fact the Snow patent teaches the filtering and gettering <u>at the same time on the same surface.</u> There is no way that such a teaching could anticipate the limitations of claim 1, in which the flow first is hydrogen sorbed and **<u>subsequently</u>** filtered. We add that getting material changes geometry as it filters because it adsorbs various impurities over time, and that in the Snow invention the getter-filter would need constant replacement because of the change in shape of the gettering/filtering surface. Snow teaches a composite layer of dendritic sinterable metal ***on top of*** a first getter layer 90, resulting in a composite layer 100.

An examination of Fig. 2(d) and 2(e) recited by the Examiner, also indicate that Snow patent does not anticipate the claims. Fig 2(d) is described at col. 9 lines 5-15, in it, the sinterered "green" form is put under pressure to form a getter layer 90, then a second layer is put on top of the getter layer, which is dendritic sinterable material, and is incorporated directly into

The getter sandwich is then cut into elements. Thus, Snow cannot anticipate any of the

dependent claims, because it fails to teach the limitations of claims 1 or 48, because these composite layers cannot include the elements of the applicants sponge and filter unit system

The amended claim 1 has been amended to reflect an aspect of the Applicant's invention. However, newly added claim 48 retains the exact subject matter of claim 1.

Claim 11 has been amended to reflect the continual monitoring of the temperature of the hydrogen sponge. This is not taught by the Snow patent.

Claim 21 has been amended to better reflect the getter protection involved in the Applicant's inventions. Thus claim 21 and the resulting dependent claims are no longer anticipated by GB 2,177,079. Claim 21 has the addition of the protective temperature sensor and placement devices which are not taught in GB 2,177,079 and for reasons detailed below also are not obvious in light of Bourne et al. discussed below.

103(a) rejections

Although we believe the amended claims 1, 11, 21, 35 and 36 are clearly not obvious in light of the prior art, we believe that comments on some of the Examiner's 103(a) rejections are warranted.

As stated above the Snow patent actually teaches away from the Applicant's invention as noted at col. 2, lines 45-53. However, we ask the Examiner to take note that the Applicant has solved the reverse flow problem in a manner unlike was suggested by the Snow patent or in a way that would be incompatible with the Snow patent. The applicant has solved the reverse flow problem with a series of thermocouples/detectors and protective barriers which could not be combined with the getter sandwich filter/sponge device of the Snow patent.

We believe that the Examiner's rejection of claims 3 and 5 is improper, mainly because the Snow patent teaches the difficulty of adjusting the diameter of the sintered particles in creating the getter/filter bed. As such we do not believe that the Snow patent suggests that the diameter may be modified with the ease (even to one skilled in the art) as the Examiner recites. Please refer to Fig. 2(a), 2(b) and 2(e) and the accompanying detailed description in the Snow patent.

getter vessel obvious, and there is not a suggestion in Bourne as how the temperature sensors

should be placed and implemented. Furthermore as the Examiner suggests in the Office Action, the suggestion is that the temperature sensor is placed in order to control the temperature (1) of the hydrogen sorption material and (b) allowing the temperature to be controlled. Neither of these conditions address the novelty of the Applicant's invention, which are reflected in the newly amended independent claims 21, 35 and 36 and mainly work for the purposes of safety, which is not suggested by Bourne. Bourne does not suggest these or how the temperature sensors might be implemented, and, as such, the Applicant's invention is cannot be obvious in light of the failure to suggest such implementation.

CONCLUSION

Accordingly, Applicant respectfully requests the USPTO allow all claims 1-29; and 32-49 which are in condition for allowance. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully Submitted,
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April 1, 2002

VERSION OF AMENDED CLAIMS SHOWING MARKED UP CHANGES

1. A gas purification system providing hydrogen sorption and particle filtering, said gas purification system comprising:

[a)] a hydrogen sponge including hydrogen sorption material;

[b)] a particle filtering device; and

[c)] an enclosure having an inlet and an outlet,

said enclosure housing said hydrogen sponge and said particle filter device, said hydrogen sponge proximal to said inlet, said particle filter device being proximal to said outlet, said hydrogen sponge and said particle filter device arranged within said enclosure such that a gas flowing into said enclosure via said inlet and out of said enclosure via said outlet, must follow a flow path first contacting said hydrogen sorption material and then flowing through the particle filtering device;[.]

wherein said hydrogen sorption material can be thermally regenerated by heating said enclosure.

_____11. (once amended) A method for purifying a gas, the method suitable for purifying gas to a level of purity sufficient for semiconductor manufacturing, the method comprising the acts of:

[a)] cooling the gas to less than 100 degrees C.

[b)] flowing the gas under pressure into a gas purification system enclosure via an inlet;

[c)] contacting said gas under pressure with a hydrogen sponge disposed within said gas purification system enclosure;

monitoring the temperature of said hydrogen sponge, wherein said flowing is shut down if the temperature of said hydrogen sponge exceeds an alarm temperature;

[d)] flowing said gas through a particle filtering device disposed within said gas purification system enclosure; and

[e)] flowing said gas out of said gas purification system enclosure via an outlet

21. (once amended) A heated getter vessel comprising:

[a)] a gas heating device;

[b)] a quantity of gas purification material;

[c)] a quantity of barrier material;

[d)] an enclosure having an inlet and an outlet, said enclosure housing said gas purification material and said gas heating device, said gas heating device proximal to the inlet, said barrier material proximal to said outlet, said gas purification material disposed between said gas heating device and said barrier material, said gas heating device, gas purification material and said barrier material arranged within said enclosure such that a gas flowing into said enclosure via said inlet and out of said enclosure via said outlet, must follow a flow path first through said gas heating device, then contacting said gas purification material and then flowing through said barrier material; and

[e)] a temperature sensor disposed in a first portion of said purification material, wherein said temperature sensor is located a distance below the top of said first portion of said purification material, wherein said temperature sensor is placed within a melt zone.

Please cancel claim 30.

31. A heated getter vessel as recited in claim [20] 29, wherein said temperature sensor is operable to detect a temperature rise of 10 degrees per millisecond.

32. A heated getter vessel as recited in claim [20] 29, further comprising an outlet filter proximal to outlet of said getter vessel.

35. (once amended) A method for purifying a gas, the method comprising the acts of:

purifying a gas within a heated getter vessel to obtain a purified gas including the acts of:

[a)] heating a gas with a gas heating device;

[b)] contacting said heated gas to a quantity of gas purification material wherein, said

[c)] providing a barrier layer, wherein said barrier layer having a quantity of barrier material operative to react with a portion of said gas purification material; [and]

determining a melt zone based on either a flow rate of said gas or an age of said gas purification material or a combination thereof;

providing a temperature sensor at said distance from the top of a first portion of said quantity of gas purification material, in such a manner that said temperature sensor falls with said melt zone,

[d)] measuring said heated gas temperature utilizing said [a] temperature sensor [disposed in at least a portion of said purification material].

36. (once amended) A gas purification system comprising:

[a)] a system inlet and a system outlet;

[b)] a gas to gas heat exchanger having a cool gas inlet, a preheated gas outlet, a heated gas inlet and a precooled gas outlet;

[c)] a heated getter vessel having an inlet, an outlet and a heat source;

at least one temperature sensor placed with said heated getter vessel, such that said at least one temperature sensor is located within a melt zone of said first quantity of gas purification material;

[d)] a gas to air heat exchanger having a precooled gas inlet and a cooled gas outlet;

[e)] an integrated hydrogen sorption and particle filter having an inlet and an outlet;

[f)] said system inlet in fluid communication with said cool gas inlet on said gas to gas heat exchanger;

[g)] said preheated gas outlet on said gas to gas heat exchanger in fluid communication with said inlet on said heated getter vessel;

[h)] said outlet on said heated getter vessel in fluid communication with said heated gas inlet on said gas to gas heat exchanger;

[i)] said precooled gas outlet on said gas to gas heat exchanger in fluid communication with said precooled gas inlet on said gas to air heat exchanger;

[k)] said outlet on said integrated hydrogen sorption and particle filter in fluid communication with said system outlet.